



Surface Mount ESD Capability Rectifiers

eSMP® Series



DO-220AA (SMP)



RoHS
COMPLIANT
HALOGEN
FREE

FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Oxide planar chip junction
- Low forward voltage drop
- Typical I_R less than 0.1 μ A
- ESD capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- **Halogen-free according to IEC 61249-2-21 definition**

| PRIMARY CHARACTERISTICS | |
|-------------------------|----------------|
| $I_{F(AV)}$ | 1.5 A |
| V_{RRM} | 100 V to 600 V |
| I_R | 5 μ A |
| V_F at $I_F = 1.0$ A | 0.868 V |
| T_J max. | 175 °C |

TYPICAL APPLICATIONS

General purpose, polarity protection, and rail-to-rail protection in both consumer and automotive applications.

MECHANICAL DATA

Case: DO-220AA (SMP)

Molding compound meets UL 94 V-0 flammability rating
Base P/N-M3 - halogen-free, RoHS compliant, and commercial grade

Base P/NHM3 - halogen-free, RoHS compliant, and automotive grade

Terminals: Matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

M3 suffix meets JESD 201 class 1A whisker test, HM3 suffix meets JESD 201 class 2 whisker test

| MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted) | | | | | | |
|---|----------------|---------------|--------|--------|--------|------|
| PARAMETER | SYMBOL | SE15PB | SE15PD | SE15PG | SE15PJ | UNIT |
| Device marking code | | 15B | 15D | 15G | 15J | |
| Maximum repetitive peak reverse voltage | V_{RRM} | 100 | 200 | 400 | 600 | V |
| Average forward current (fig. 1) | $I_{F(AV)}$ | 1.5 | | | | A |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | I_{FSM} | 30 | | | | A |
| Operating junction and storage temperature range | T_J, T_{STG} | - 55 to + 175 | | | | °C |



| ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | | |
|---|---|-----------------------------------|-------------|-------|------|---------------|
| PARAMETER | TEST CONDITIONS | SYMBOL | TYP. | MAX. | UNIT | |
| Maximum instantaneous forward voltage | $I_F = 1.5\text{ A}$ | $T_A = 25\text{ }^\circ\text{C}$ | $V_F^{(1)}$ | 0.968 | 1.05 | V |
| | | $T_A = 125\text{ }^\circ\text{C}$ | | 0.868 | 0.95 | |
| Maximum reverse current | Rated V_R | $T_A = 25\text{ }^\circ\text{C}$ | $I_R^{(2)}$ | - | 5.0 | μA |
| | | $T_A = 125\text{ }^\circ\text{C}$ | | 5.4 | 50 | |
| Maximum reverse recovery time | $I_F = 0.5\text{ A}$, $I_R = 1.0\text{ A}$, $I_{rr} = 0.25\text{ A}$ | t_{rr} | 900 | - | ns | |
| Typical junction capacitance | 4.0 V, 1 MHz | C_J | 9.5 | - | pF | |

Notes

- (1) Pulse test: 300 μs pulse width, 1 % duty cycle
 (2) Pulse test: Pulse width $\leq 40\text{ ms}$

| THERMAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | | |
|--|-----------------------|--------|--------|--------|--------|--------------------|
| PARAMETER | SYMBOL | SE10PB | SE10PD | SE10PG | SE10PJ | UNIT |
| Typical thermal resistance | $R_{\theta JA}^{(1)}$ | 105 | | | | $^\circ\text{C/W}$ |
| | $R_{\theta JL}^{(1)}$ | 25 | | | | |
| | $R_{\theta JC}^{(1)}$ | 30 | | | | |

Note

- (1) Thermal resistance from junction to ambient and junction to lead mounted on PCB with 5.0 mm x 5.0 mm copper pad areas. $R_{\theta JL}$ - is measured at the terminal of cathode band. $R_{\theta JC}$ is measured at the top center of the body.

| IMMUNITY TO ELECTRICAL STATIC DISCHARGE TO THE FOLLOWING STANDARDS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | |
|--|--|--|--------|-------|------------------|
| STANDARD | TEST TYPE | TEST CONDITIONS | SYMBOL | CLASS | VALUE |
| AEC-Q101-001 | Human body model (contact mode) | $C = 100\text{ pF}$, $R = 1.5\text{ k}\Omega$ | V_C | H3B | $> 8\text{ kV}$ |
| AEC-Q101-002 | Machine model (contact mode) | $C = 200\text{ pF}$, $R = 0\text{ }\Omega$ | | M4 | $> 400\text{ V}$ |
| JESD22-A114 | Human body model (contact mode) | $C = 150\text{ pF}$, $R = 1.5\text{ k}\Omega$ | | 3B | $> 8\text{ kV}$ |
| JESD22-A115 | Machine model (contact mode) | $C = 200\text{ pF}$, $R = 0\text{ }\Omega$ | | C | $> 400\text{ V}$ |
| IEC 61000-4-2 ⁽²⁾ | Human body model (contact mode) | $C = 150\text{ pF}$, $R = 150\text{ }\Omega$ | | 4 | $> 8\text{ kV}$ |
| | Human body model (air-discharge mode) ⁽¹⁾ | $C = 150\text{ pF}$, $R = 150\text{ }\Omega$ | | 4 | $> 15\text{ kV}$ |

Notes

- (1) Immunity to IEC 61000-4-2 air discharge mode has a typical performance $> 30\text{ kV}$
 (2) System ESD standard

| ORDERING INFORMATION (Example) | | | | |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| SE10PJ-M3/84A | 0.024 | 84A | 3000 | 7" diameter plastic tape and reel |
| SE10PJ-M3/85A | 0.024 | 85A | 10 000 | 13" diameter plastic tape and reel |
| SE10PJHM3/84A ⁽¹⁾ | 0.024 | 84A | 3000 | 7" diameter plastic tape and reel |
| SE10PJHM3/85A ⁽¹⁾ | 0.024 | 85A | 10 000 | 13" diameter plastic tape and reel |

Note

- (1) Automotive grade



RATINGS AND CHARACTERISTICS CURVES

($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

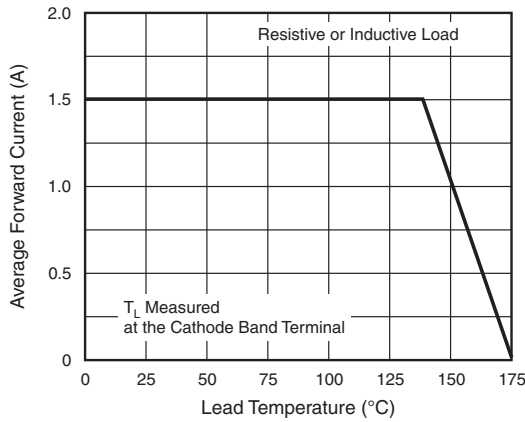


Fig. 1 - Maximum Forward Current Derating Curve

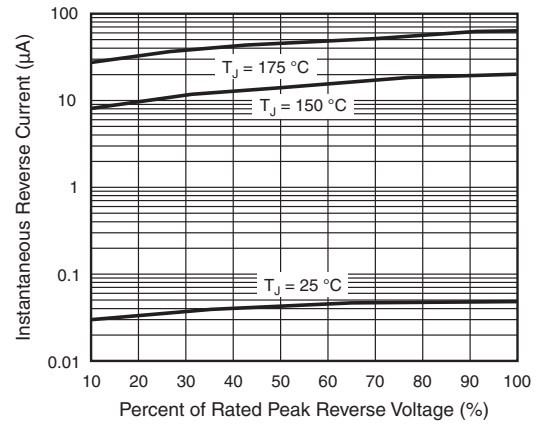


Fig. 4 - Typical Instantaneous Forward Characteristics

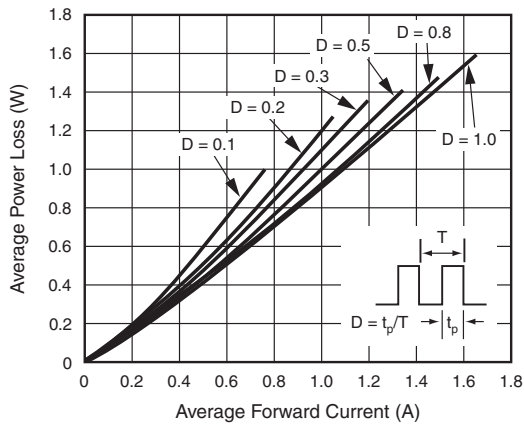


Fig. 2 - Forward Power Loss Characteristics

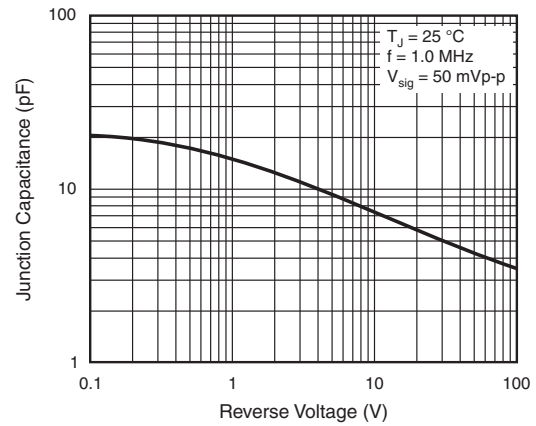


Fig. 5 - Typical Instantaneous Forward Characteristics

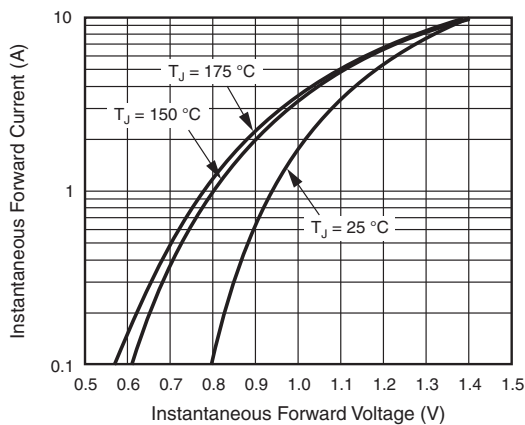
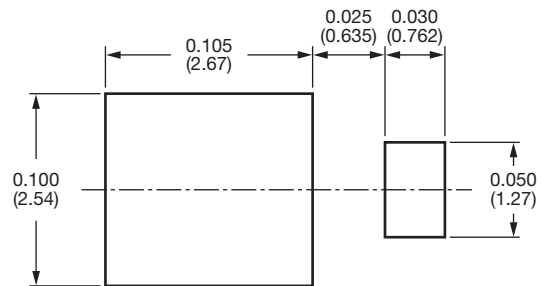
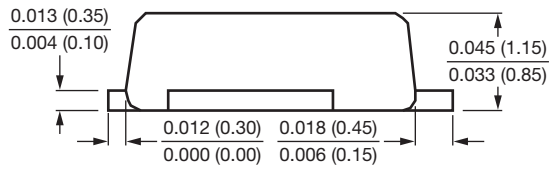
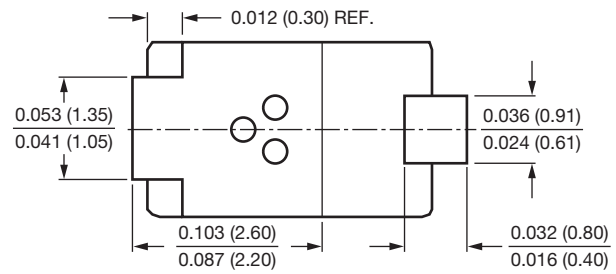
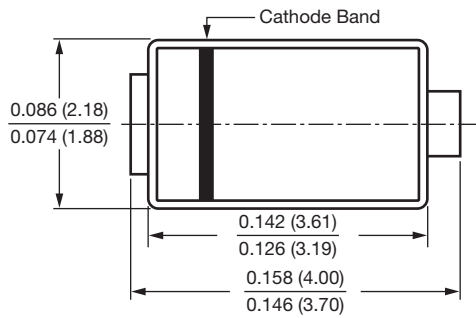


Fig. 3 - Forward Power Loss Characteristics



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

DO-220AA (SMP)





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